HOMEWORK 8-5

See the graphs on the following slides...

Name: Key

Period : _____

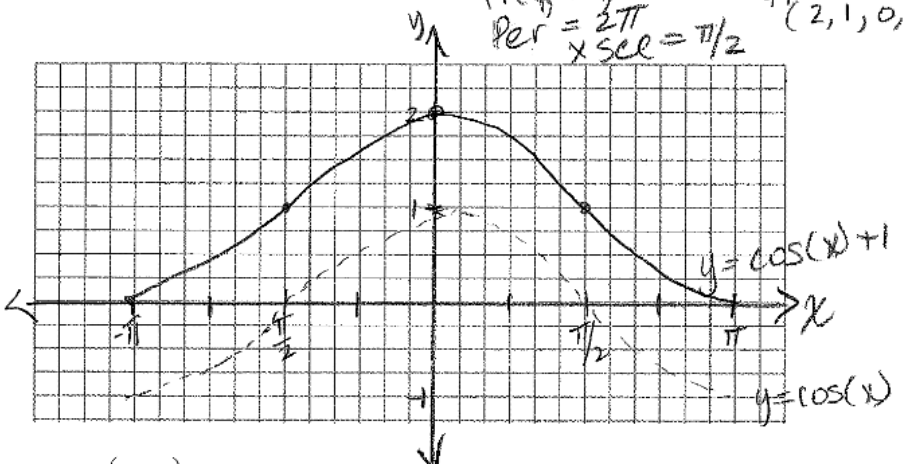
Algebra 2 Homework 8.5

1. Graph f(x)= cos(x)+1 for $-\pi \leq x \leq \pi$. Show all work as done in class.

y= cos(x) up 1

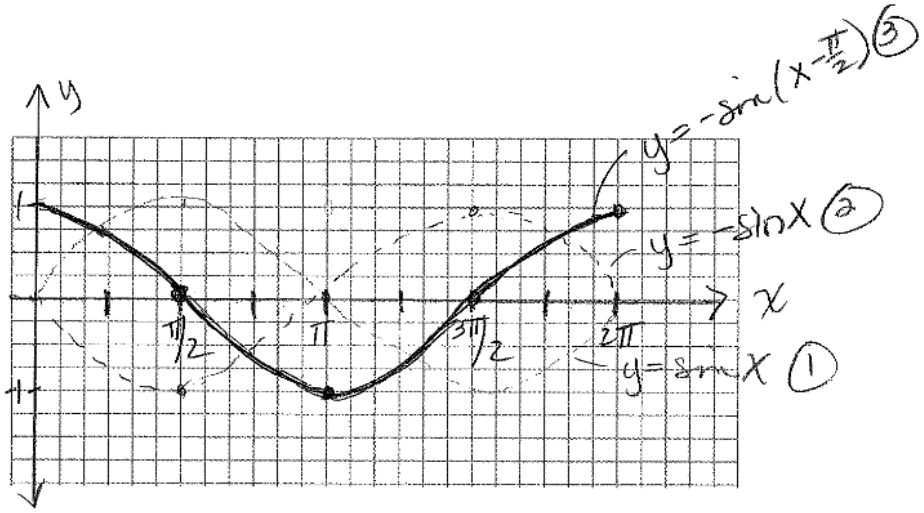
amp = 1
range = [0, 2]
freq = $1/2\pi$
per = 2π
x scl = $\pi/2$

(1, 0, -1, 0, 1)
+1
(2, 1, 0, 1, 2)



2. Graph $f(x) = -\sin\left(x - \frac{\pi}{2}\right)$ for $0 \le x \le 2\pi$. Show all work as done in class.

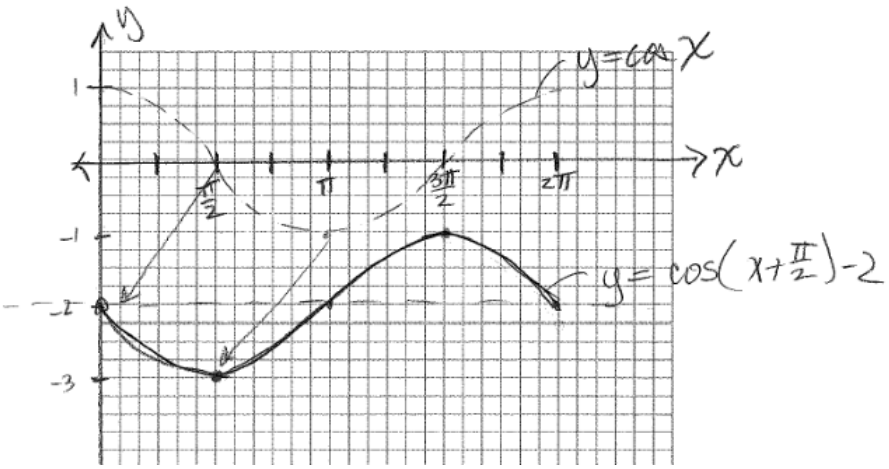
$y = \sin x$ reflected x-axis and translated $\pi/2$ to Right.



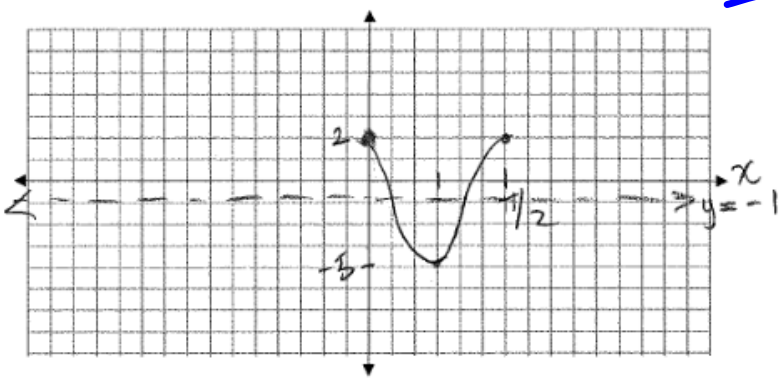
3. Graph $f(x)=\cos\left(x+\frac{\pi}{2}\right)-2$ for $0 \le x \le 2\pi$. Show all work as done in class.

$y=\cos x$ translated left $\pi/2$ and down 2

6 D's 8 D's



4. (*) On the set of axes below, graph one cycle of a cosine function with amplitude 3, period $\frac{\pi}{2}$, midline y = -1, and passing through the point (0, 2).



Day 6: Writing Equations of Trig Graphs

Vertical Shifts

$f(x) = A\cos(\omega x) + k$ or $f(x) = A\sin(\omega x) + k$

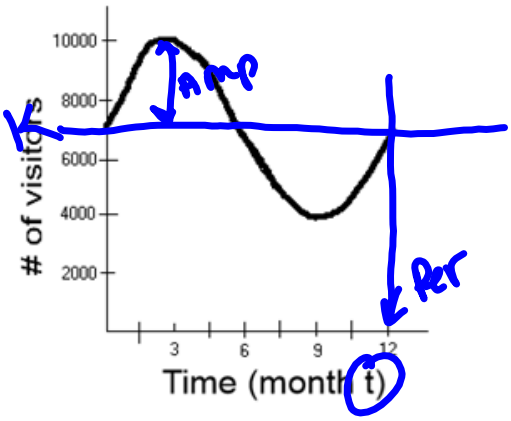
where k is the vert. shift

$y = k$ is midline

No phase shifts!

Example

The number of visitors at a resort rises and falls during the year according to the accompanying graph. Determine an equation of this graph in terms of the month number, t.



sine curves start on the midline

① Sine curve

② Amp = 3000 not reflected

$A = 3000$

③ Per = 12

④ $\omega = \frac{2\pi}{Per} = \frac{2\pi}{12} = \frac{\pi}{6}$

⑤ $K = 7000$

$$f(t) = 3000\sin\left(\frac{\pi}{6}t\right) + 7000$$

$\frac{Per}{1} = \frac{2\pi}{\omega}$

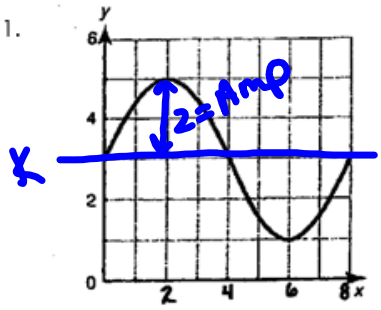
$\frac{2\pi}{Per} = \frac{\omega \cdot Per}{Per}$

Writing equations of Trig Graphs

$f(x) = A\cos(\omega x) + k$ or $f(x) = A\sin(\omega x) + k$

If each of the following graphs represents a vertical translation of basic sine or cosine curve, write an equation of the translated graph shown:

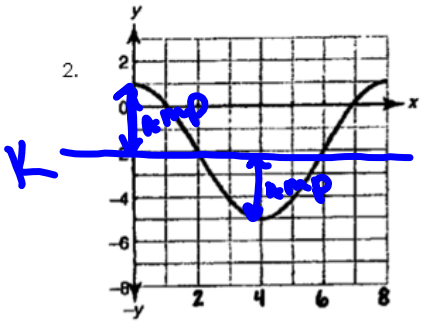
1.



① sine
② Amp = 2 not reflected A = 2
③ Per = 8
④ $w = \frac{2\pi}{8} = \frac{\pi}{4}$
⑤ K = 3

$f(x) = 2\sin\left(\frac{\pi}{4}x\right) + 3$

2.

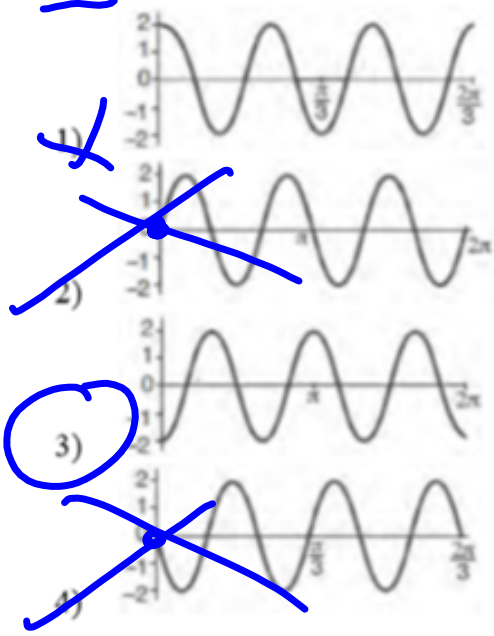


① cosine
② Amp = 3 not reflected A = 3
③ Per = 8
④ $w = \frac{2\pi}{8} = \frac{\pi}{4}$
⑤ K = -2

$f(x) = 3\cos\left(\frac{\pi}{4}x\right) - 2$

3. Regents Question: January 2017

Which graph represents a cosine function with no horizontal shift, an amplitude of 2, and a period of $\frac{2\pi}{3}$?



1 cycle in $\frac{2\pi}{3}$

3 cycles in $\frac{2\pi}{3}$

$3 \cdot w$

3 cycles in 2π

$P = \frac{2\pi}{w} = \frac{2\pi}{3}$

Regents Question:

4. The voltage used by most households can be modeled by a sine function. The maximum voltage is 120 volts, and there are 60 cycles *every second*. Which equation best represents the value of the voltage as it flows through the electric wires, where t is the time in seconds?

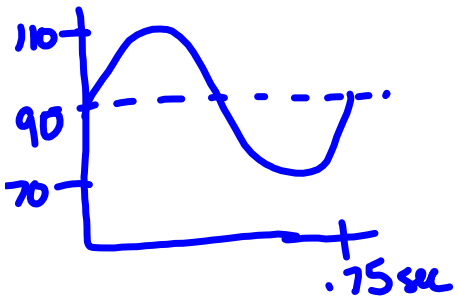
a. $V = 120\sin(t)$
b. $V = 120\sin(60\pi t)$
c. $V = 120\sin(60t)$
d. $V = 120\sin(120\pi t)$

$\omega = \frac{2\pi}{Per}$

$Per = \frac{1}{60}$ sec

$\omega = \frac{2\pi}{1/60} = 2\pi \cdot 60 = 120\pi$

5. An athlete was having her blood pressure monitored during a workout. Doctors found that her maximum blood pressure, known as systolic, was 110 and her minimum blood pressure, known as diastolic, was 70. If each heartbeat cycle takes 0.75 seconds, then determine a sinusoidal model, in the form $f(t) = A\sin(Bt) + C$, for her blood pressure as a function of time t in seconds. Show the calculations that lead to your answer.



① sine

② Amp = 20 = A

③ $K = \frac{70+110}{2} = 90 = C$

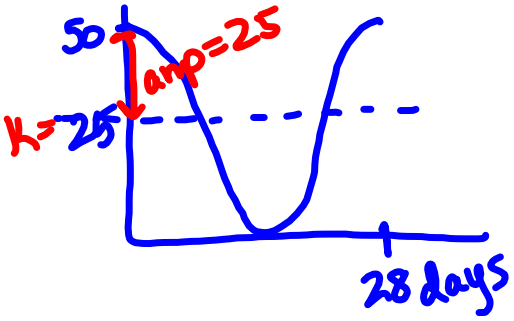
④ $B = \omega = \frac{2\pi}{.75} = \frac{2\pi}{3/4} = 2\pi\left(\frac{4}{3}\right)$

$\frac{8}{3}\pi$

$$f(t) = 20\sin\left(\frac{8}{3}\pi t\right) + 90$$

6. The percentage of the moon's surface that is visible to a person standing on the Earth varies with the time since the moon was full. The moon passes through a full cycle in 28 days, from full moon to full moon. The maximum percentage of the moon's surface that is visible is 50%. Determine an equation, in the form $P(t) = A\cos(Bt) + C$ for the percentage of the surface that is visible, P, as a function of the number of days, t, since the moon was full. Show the work that leads to the values of A, B, and C.

Per = 28 days



$k = C = 25$

$A = 25$

$w = B = \frac{2\pi}{28} = \frac{\pi}{14}$

$P(t) = 25\cos\left(\frac{\pi}{14}t\right) + 25$